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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/476,615	12/31/1999	MICHAEL S. CRONE	GE-W-192-CIP	8072

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EXAMINER	
BOYCE, ANDRE D	
ART UNIT	PAPER NUMBER
3623	

DATE MAILED: 03/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/476,615	CRONE, MICHAEL S.	
	Examiner	Art Unit	
	Andre Boyce	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 December 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6-8,13,and 16-19* is/are rejected.

7)☒ Claim(s) *4,5,9-12,14 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *30 December 2002* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. This Non-Final Office Action is in response to Applicant's amendment filed December 30, 2002. Claims 1-19 are pending.

2. The oath/declaration submitted December 30, 2002 is accepted by the Examiner.

The previously pending objection to Figure 2 has been withdrawn.

The previously pending objection to the specification has been withdrawn.

3. Applicant's arguments with respect to claims 1-3, 6-8, 13, 16, and 18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 6-8, 13, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matheson et al (USPN 5,623,413), in view of Fabre et al (USPN 6,405,186).

As per claim 1, Matheson et al disclose in a multiple move, simulated annealing method for resolving a scheduling problem associated with a plurality of orders for train resources, each order having a cost function and a scheduling window associated therewith (see column 19, lines 4-8). Matheson et al does not disclose the improvement comprising the steps of: (a) establishing plural criteria for acceptance of a solution; (b) classifying the scheduling problem; and (c) selecting the criteria for acceptance of a solution as a function of the classification of the scheduling problem. Fabre et al discloses classifying requests in accordance with certain criterion, and for each request classifying the opportunities in accordance with the certain criterion (see column 6, lines 11-16). Both Matheson and Fabre are concerned with optimizing a cost function via the simulated annealing technique, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include (a) establishing plural criteria for acceptance of a solution; (b) classifying the scheduling problem; and (c) selecting the criteria for acceptance of a solution as a function of the classification of the scheduling problem in Matheson, as seen in Fabre, as a way to improve the quality of the plan obtained at the end of the process or to improve the speed of convergence on the solution (see Fabre, column 6, lines 5-10), thus making the Matheson system more effective.

As per claim 2, Matheson et al disclose (a) determining the total trip time associated with the plurality of orders (determined by the movement planner, based upon the trajectory of the train, see columns 13, lines 14-16 and 38-46); and (b) determining the total slack time associated with the plurality of orders (see column

26, lines 16-19, where the total time is calculated from slack percentage). Matheson et al does not explicitly disclose (c) determining the classification of the problem as a function of the total trip time and the slack time. Fabre et al discloses classifying requests in accordance with certain criterion (see column 6, lines 11-14). Further, Matheson et al discloses rule-based criteria that incorporate company policy, operating procedures, and experience factors, among others (see column 24, lines 4-6), wherein train operating procedures include total trip time and slack time, associated therein. Both Matheson and Fabre are concerned with optimizing a cost function via the simulated annealing technique, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include determining the classification of the problem in accordance with certain criterion in Matheson, as seen in Fabre, as a way to improve the quality of the plan obtained at the end of the process or to improve the speed of convergence on the solution (see Fabre, column 6, lines 5-10), thus making the Matheson system more effective.

As per claims 3 and 7, Matheson et al does not explicitly disclose (a) selecting a predetermined percentage of total trip time to provide a threshold value; and (b) comparing slack time with the threshold value. Fabre et al discloses developing threshold parameters in accordance with the simulated annealing technique (see column 5, lines 46-55), while Matheson et al discloses rule-based criteria that incorporate company policy, operating procedures, and experience factors, among others (see column 24, lines 4-6), wherein train operating procedures include total trip time and slack time, associated therein. Both Matheson and Fabre are

concerned with optimizing a cost function via the simulated annealing technique, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include selecting a predetermined percentage of total trip time to provide a threshold value; and comparing slack time with the threshold value in Matheson, as a way to improve the quality of the plan obtained at the end of the process or to improve the speed of convergence on the solution (see Fabre, column 6, lines 5-10), thus making the Matheson system more effective.

As per claim 6, Matheson et al disclose (a) determining the total trip time associated with the plurality of orders (determined by the movement planner, based upon the trajectory of the train, see columns 13, lines 14-16 and 38-46); and (b) determining the resource exception associated with the plurality of orders (see column 21, lines 10-12). Matheson et al do not explicitly discloses (c) determining the classification of the problem as a function of the total trip time and the resource exception. Fabre et al discloses classifying requests in accordance with certain criterion (see column 6, lines 11-14). Further, Matheson et al discloses rule-based criteria that incorporate company policy, operating procedures, and experience factors, among others (see column 24, lines 4-6), wherein train operating procedures include resource exception, total trip time and slack time, associated therein. Both Matheson and Fabre are concerned with optimizing a cost function via the simulated annealing technique, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include determining the classification of the problem in accordance with certain criterion in Matheson, as

seen in Fabre, as a way to improve the quality of the plan obtained at the end of the process or to improve the speed of convergence on the solution (see Fabre, column 6, lines 5-10), thus making the Matheson system more effective.

As per claim 8, Matheson et al disclose in a multiple move, simulated annealing method for resolving a scheduling problem associated with a plurality of orders for train resources having an initial resource exception and a cost associated therewith by evaluating the resource exception and cost associated with each move during a search phase (see column 19, lines 4-8). Matheson et al does not explicitly disclose the step of emphasizing cost over resource exception for a predetermined initial period of the search phase. However, Matheson does disclose the concept of energy being the weighted combination of resource exception and operating costs, where the energy function gives more emphasis to the critical resources (see column 21, lines 10-13), therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include emphasizing cost over resource exception for a predetermined initial period of the search phase in Matheson, thereby giving more emphasis to the element deemed more important in the particular annealing method, thus making the method more flexible.

As per claims 13 and 16, Matheson et al disclose a method for resolving a scheduling problem associated with a plurality of orders for train resources by evaluating available moves in a simulated annealing process, each move resulting in a change in the resource exception associated with the problem and a change in cost associated with the move (see column 19, lines 4-8), comprising the steps of:

(b) making a random move (see column 19, lines 14-15), (c) weighting the resource exception and cost factors associated with the random move (see column 21, lines 10-13); (d) evaluating the resource exception and the cost of the solution against a predetermined criteria (energy function); and g) accepting or rejecting the move based on the evaluation (see column 19, line 17-20). Matheson et al does not disclose (a) classifying the scheduling problem, a scaling parameter related to the classification of the problem, and the predetermined criteria is the classification of the problem. Fabre et al discloses classifying requests in accordance with certain criterion (see column 6, lines 11-14), and selecting the opportunities in the order determined by the classification (scaling parameter). Both Matheson and Fabre are concerned with optimizing a cost function via the simulated annealing technique, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include determining the classification of the problem in accordance with certain criterion in Matheson, as seen in Fabre, as a way to improve the quality of the plan obtained at the end of the process or to improve the speed of convergence on the solution (see Fabre, column 6, lines 5-10), thus making the Matheson system more effective.

As per claim 17, Matheson et al disclose in a multiple move, simulated annealing method of scheduling train resources by considering the resource exception value and the cost associated with each of the moves (see column 19, lines 4-8). Matheson et al does not disclose the improvement comprising the step of limiting the total resource exception time to approximately one percent of the total unopposed

trip time. However, Matheson et al disclose the resource exception being weighted as a function of other factors (see column 21, lines 10-13), therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include limiting the total resource exception time to approximately one percent of the total unopposed trip time, in Matheson et, as a weighted constraint based upon trip time, thus allowing the energy function to focus on critical resources.

As per claim 18, Matheson et al disclose in a multiple move, simulated annealing method of solving a problem in the scheduling of train resources (see column 19, lines 4-8). Matheson et al does not disclose reducing the level of acceptance of a solution in the evaluations of the results of early moves in order to preserve options for subsequent moves. However, Matheson discloses optimization allowed to take some bad moves early (see column 19, lines 15-18), therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include reducing the level of acceptance of a solution in the evaluations of the results of early moves in order to preserve options for subsequent moves in Matheson, thereby focusing the attention of the annealing method in more critical areas in later stages of the search process (see column 19, lines 24-34), thus making the method more effective.

As per claim 19, Matheson et al does not disclose by evaluating the resource exception and cost associated with each move during a search phase, the steps of: (a) providing a target resource exception; and (b) weighting evaluations of the effects of subsequent moves on the resource exception and cost as a function of the

departure of resource exception from the target. However, providing a target would be a logical progression, since Matheson et al disclose the resource exception being weighted as a function of other factors (see column 21, lines 10-13). Further, evaluation thereof is inherent in simulated annealing techniques, therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to include (a) providing a target resource exception; and (b) weighting evaluations of the effects of subsequent moves on the resource exception and cost as a function of the departure of resource exception from the target, in Matheson et al thereby further focusing the optimization, and allowing the energy function to focus on critical resources.

Response to Arguments

6. In the Remarks, Applicant argues with respect to claims 17 and 19, in response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Further, with respect to claim 17, Matheson discloses modification of the trip time reflecting the importance of the next trip (i.e., resource exception),

thereby providing further motivation to modify Matheson. With respect to claim 19, the Examiner maintains that the resource exception being weighted as a function of other factors is motivation to establish a target resource exception, and weight subsequent moves accordingly.

Allowable Subject Matter

7. Claims 4, 5, 9-12, and 14-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre Boyce whose telephone number is (703) 305-1867. The examiner can normally be reached on 9:30-6pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (703) 305-9643. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7687 for regular communications and After Final communications, and (703) 746-7305 for informal/draft communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

adb
March 4, 2003

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